# GeoTimes

Professional News Magazine

**July 1957**

Volume II, No. 1

Published Monthly by the
American Geological Institute

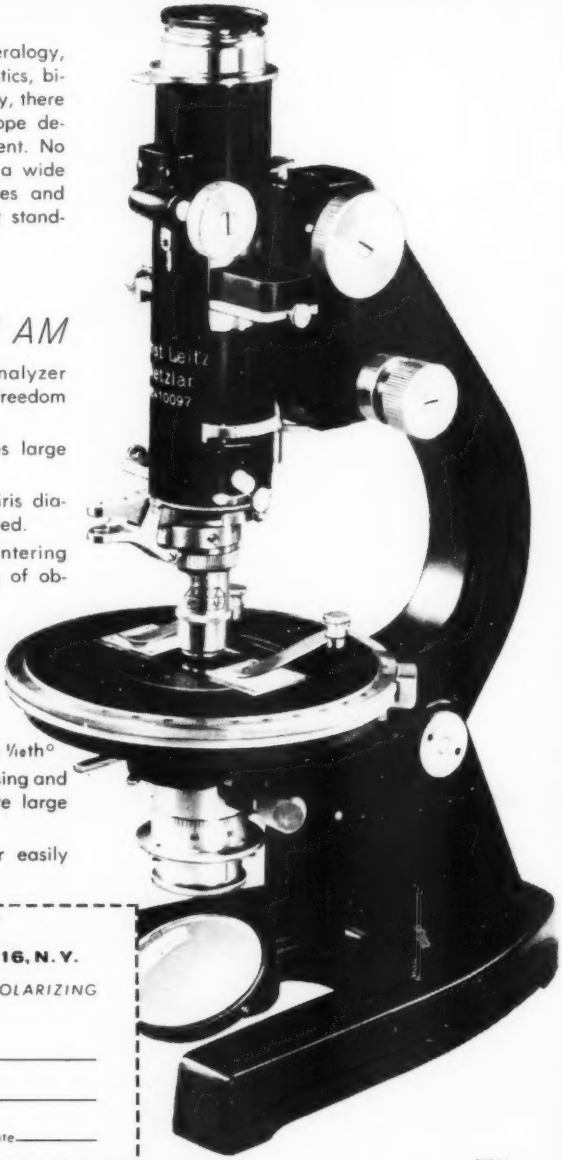
*for precision microscopy with polarized light*

# Leitz **POLARIZING** *microscopes*

In such fields as geology, mineralogy, petrography, coal research, plastics, biology, chemistry and biochemistry, there is a Leitz *POLARIZING* Microscope designed to meet every requirement. No other manufacturer offers such a wide variety of polarizing microscopes and accessories, built to the highest standards of quality and design.

## *Leitz polarizing microscope, Model AM*

- Rotating anastigmatic tube analyzer for improved image quality and freedom from eyestrain.
- Polarizing tube accommodates large field-of-view eyepieces.
- Bertrand auxiliary lens with iris diaphragm can be raised and lowered.
- Rapid clutch changer and centering device for permanent centering of objectives.
- Large substage illuminating apparatus with two-diaphragm condenser and polarizer, either calcite or filter.
- Rotating object stage on ball bearings, with vernier reading to 1/10th°
- Rack and pinion motion for raising and lowering stage, to accommodate large opaque specimens.
- Polarizing vertical illuminator easily attachable.



**E. LEITZ, INC., Dept. GT-7**
**468 Fourth Ave., New York 16, N. Y.**

Please send brochure on Leitz *POLARIZING* Microscopes

Name_____

Street_____

City_____ Zone____ State_____

08555

**E. LEITZ, INC., 468 FOURTH AVENUE, NEW YORK 16, N. Y.**
**Distributors of the world-famous products of Ernst Leitz, Wetzlar, Germany**
**LENSES • CAMERAS • MICROSCOPES • BINOCULARS**

# Calendar

*Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.*

July 1, 1957-December 31, 1958—THE INTERNATIONAL GEOPHYSICAL YEAR.

July 10-19, 1957—INTERNATIONAL UNION OF CRYSTALLOGRAPHY, 4th General Assembly & International Congress. McGill Univ., Montreal, Quebec.

July 22-24, 1957—SYMPOSIUM ON GEOCHEMISTRY, IUPAC Comm. of Geochem. & Sect. of Inorg. Chem. Paris, France.

August, 1957—INTERNAT. ASSOC. OF SEISMOLOGY & Physics of the Earth's Interior, Toronto, Ont.

August, 1957—INTERNATIONAL ASSOC. OF PHYSICAL OCEANOGRAPHY, General Assembly, Canada.

Aug. 19-23, 1957—SIXTH NATIONAL CLAY CONFERENCE, Univ. of Calif., Berkeley. Reg. fee $6.00: Univ. Extension, Univ. of Calif., Berkeley 4, Calif.

Aug. 21-24, 1957—ROCKY MTN. ASSOC. OF GEOLOGISTS, North & Middle Park Field Trip. 200 person limit, regist. deadline Aug. 1, '57. Write: R. C. Johnston, c/o Pan Amer. Petr. Corp., P.O. Box 509, Denver, Colo.

Sept. 2-16, 1957 — FIFTH CONGRESS OF INQUA, Madrid, Spain. For information write: L. Sole Sabaris, Instituto Geologico, Universidad Barcelona, Spain.

CARBON-14 DATING, 3rd Internat'l. Conf., in conjunction with INQUA, Madrid. Write: M. Rubin, U. S. Geological Survey, Washington 25, D. C.

Sept. 3-13, 1957—PHYSICAL OCEANOGRAPHY & COASTAL ENGINEERING, Special course, A. & M. Coll. of Texas, College Station. Final reg. date: July 6, '57. Apply: R. M. Adams, Dept. of Oceanography & Meteorology, A. & M. Coll. of Tex., College Station, Tex.

Sept. 3-14, 1957 — INTERNAT. UNION OF GEODESY & GEOPHYSICS, 11th Gen. Assembly, Toronto, Canada. Add.: Dr. J. A. Jacobs, 49 St. George St., Toronto, Ont., Canada.

Sept. 5-7, 1957—NEW MEXICO GEOL. SOC., Eighth Ann. Field Conf. in the Durango-Silverton-Ouray area of S.W. Colo. Limited to 150. Write: Mrs. Marion Murks, Box 652, Socorro, N.M.

Sept. 8-Oct. 9—SIXTH COMMONWEALTH MINING & METALLURGICAL CONG., visiting mining industries from British Columbia to Nova Scotia on invitation of Canadian Inst. Mining & Metallurgy. Write Exec. Sec. 6th Commonwealth M. & M. Cong., 837 W. Hastings St., Vancouver 1, B.C., Canada.

Sept. 9-10, 1957—AMER. CERAMIC SOC., Basic Science Div., State U. of N.Y. Coll. of Ceramics, Alfred Univ., Alfred, N. Y.

Sept. 10-13, 1957—ALASKAN SCIENCE CONFERENCE, 8th, Anchorage, Alaska. Write airmail to Wm. B. Page, Gen. Chrmn., 8th Alaska Sci. Conf., Arctic Health Res. Center, Box 960, Anchorage, Alaska.

Sept. 10-13, 1958—4th INTRNTL. CONG. on Carboniferous Stratig. & Geol., Heerlen, Netherlands. Also 1st Intrntl. mtg. on Coalpetrology.

Sept. 12-14, 1957—WYOMING GEOLOGICAL ASSOCIATION, 12th Ann. Field Conf., in SW Wind River Basin, hdqtrs. at Lander, Wyo. Write: Mike S. Johnson, Box 2249, Casper, Wyo.

Sept. 13-14, 1957—ARDMORE GEOLOGICAL SOCIETY Field Conference; Criner Hills-Lake Murray Area of South-central Oklahoma. Write: R. B. Harrington, P.O. Box 1099, Ardmore, Okla.

Sept. 20-Oct. 2, 1957—PAN INDIAN OCEAN SCIENCE Congress, Tananarive, Madagascar.

Oct. 4-6, 1957—NINTH INDIANA GEOLOGIC FIELD CONFERENCE on rocks associated with the Mississippian-Pennsylvanian unconformity in SW Indiana. Sponsored by Ind. G.S. & the Dept. of Geol. of Ind. Univ. Spring Mill State Park.

Oct. 4-6, 1957—49th ANNUAL NEW ENGLAND INTERCOLLEGIATE GEOL. CONF., in the environs of Amherst & central Mass. Spons. by 4-Coll. Geol. Depts., George Bain, Amherst Coll., 1957 Chrmn.

Oct. 15-18, 1957—SOUTHEASTERN STATES MINING CONF., sponsored by Fla. Sect. AIME & the Soc. of Min. Engrs. of AIME, Hillsboro Hotel, Tampa, Fla.

Oct. 17-19, 1957—FOUR CORNERS GEOLOGICAL SOC. FIELD CONFERENCE, 2nd Gallup New Mex. For information write P. O. Box 615, Albuquerque, N. M.

Oct. 30-Nov. 1, 1957—ROCKY MTS. MINERALS CONF. AIME, Denver, Colo.

Nov. 3, 1957—SVP ANN. MTG., Acad. Nat. Sci., Philadelphia, Pa.

Nov. 4-5, 1957—SVP Technical Sessions, with GSA, etc., Atlantic City, N. J.

Nov. 4-6, 1957—GSA, ANN. MTG., Atlantic City, N. J. Geochem., MSA & PS ann. mtgs. in conjunction.

Nov. 6-8, 1957—GULF COAST ASSOC. OF GEOL. SOCIETIES, 7th Ann. Mtg., New Orleans, La.

Nov. 7-8, 1957—SEGp, PACIFIC COAST SECTION, Ambassador Hotel, Los Angeles, Calif. Write: J. A. Hugus, Western Gulf Oil Co., 900 Wilshire Blvd., Los Angeles.

Nov. 11-14, 1957—SEGp, 27th ANNUAL MEETING, Statler-Hilton Hotel, Dallas, Texas.

Nov. 18-Dec. 9, 1957—9TH PACIFIC SCIENCE CONGRESS, Pacif. Sci. Assoc., Chulalongkorn University, Bangkok, Thailand.

Dec. 26-31, 1957—AAAS, Nat. Mtg., Indianapolis, Ind.

1960—XXIst INTERNATIONAL GEOLOGICAL CONGRESS, Copenhagen, Denmark. Field excursions to Scandinavian countries.

---

# *This Month in* GEOTIMES

Professional News Magazine

*Published by* THE AMERICAN GEOLOGICAL INSTITUTE

Robert C. Stephenson, EDITOR

Kathryn Lohman, CIRCULATION MANAGER

Vol. II, No. 1 July, 1957

*Page*

The International Geophysical Year
By HUGH ODISHAW ..... 6

IGY and Its Significance to Exploration Geophysics
By PAUL L. LYONS ..... 8

Some Geological Aspects of the Oceanographic Program of the IGY
By GORDON G. LILL ..... 10

IUGG—Toronto, September 3-14 ..... 15

Canadians Host to Commonwealth Mining and Metallurgical Congress ..... 16



GEOTIMES is published monthly by the American Geological Institute at Williams & Heintz Lithograph Corporation, Washington, D. C. Editorial, Circulation and Advertising Offices are at 1515 Massachusetts Ave., N.W. Address all correspondence to 2101 Constitution Ave., N.W., Washington 25, D. C.

Subscriptions: Distributed to members of member societies as a part of their societies' membership. Non-member, U.S.A. and Possessions, Canada and Mexico, $2.00 per year; elsewhere, $2.50 per year.

# HUNGARIAN GEOLOGISTS

## . . . one placed

## . . . . . one to go

The American Geological Institute staff is most pleased to have played a part in the relocation of a young Hungarian mining geologist, *Geza Kisvarsanyi*, who is now working with the Bear Creek Mining Co. in Rolla, Missouri. It was early February when Mrs. Linda Grover of the staff of the International Rescue Committee sought the aid of the AGI in the placing of geologist Kisvarsanyi.

His brief resume told that the young Hungarian had graduated from the University of Budapest, taught mineralogy and petrography, supervised a sizable diamond drilling exploration program, was married, had no children, spoke little English, but was conversant in German. Armed with this somewhat sketchy information, the AGI, by telephone and letter, contacted a number of companies, universities, state surveys, and research laboratories. Out of several scores of contacts which were made, about 3-4 definite possibilities developed. Mrs. Grover of the International Rescue Committee arranged for interviews between Kisvarsanyi and the prospective employers. It was through these channels that he was interviewed and hired by the Bear Creek Mining Co., a subsidiary of the Kennecott Copper Company.

The AGI is pleased to have participated in the successful placement of Geza Kisvarsanyi, but not at all pleased that staff limitations have prevented the Institute from assisting in the placement of several other earth scientists who were cleared through the Camp Kilmer office of the National Academy of Sciences. One of the most frustrating aspects of the placement efforts was the fact that, although the United States government welcomed the Hungarian refugees to our country, the doors were closed to their employment by government and by companies or research institutes having government research contracts.

*If your company would have possible interest in employing a Hungarian geologist-petroleum engineer, PETER GAL, age 30, please contact the AGI.* Unlike many refugees, GAL speaks fluent English. He has studied geology at the Sorbonne and petroleum engineering at the French National Petroleum School.

# *Geo....*

*Geo*=earth and *ology*=science or branch of knowledge. Therefore, it should add that *geo*+*ology* should equal the science of the earth. The modern scientific mind, it would appear, is so bent on compartmentalizing scientific knowledge that, in this case, 2+2 no longer equals 4. In the minds of many of the modern-day geo-scientists, this oblate spheroid called earth has been cut up like a watermelon, and each group of specialists is off in its own little bailiwick, nibbling away, up to its ears, at that slice of the melon which it has carved as its own. One slice represents the physics of earth, another slice represents the rocks, another the modern oceans, and so on.

Certainly it is next to impossible to reconstruct much of the history of the rocks of the earth without some idea of the physics of erosion, deposition, metamorphism and igneous activities. Conversely, it is likewise difficult, if not impossible, to understand the physical properties of the earth without recognizing and understanding the story in the rocks constituting the earth.

The International Geophysical Year, which officially opened on July 1, will make an unprecedented attack on unsolved problems relating to the physics of the earth. Data may well be accumulated much more rapidly than it can be interpreted. Conspicuously absent from the vast flood of publicity relative to the IGY is the word geology, science of the earth. However, the data coming out of the IGY programs of geomagnetism, seismology, oceanography, etc., may well provide the basis for a spurt in the knowledge of the earth and the history of the earth—geology.

Instead of cutting an IGY-grown melon into slices of specialization, it can be hoped that isolated fragments of the great "geo-puzzle" may be fitted together by a team of specialists, each adding their particular talents to the full development of the knowledge of our earth. The IGY can add immeasurably to a fuller utilization of the earth and its resources.

**OUR COVER**

THE INTERNATIONAL GEOPHYSICAL YEAR, which was launched July 1, 1957, will be an unprecedented 18-month period of examination and measurement of physical properties of the earth.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

# The International Geophysical Year

by

HUGH ODISHAW[1]

The most comprehensive investigation of the planet Earth began on July 1, 1957, the formal opening of the International Geophysical Year. For a period of 18 months, more than 61 countries will be engaged in a coordinated attack upon a host of problems associated with man's physical environment.

The need for an IGY effort stems from the nature of the phenomena in most of the fields of geophysics. These phenomena are world-wide and even cosmic in their occurrences, and many of them are closely interrelated. Accordingly, the primary purpose of the IGY is to secure synoptic data in order to obtain a fuller planetary concept of the events in a given discipline as well as to permit the establishment of better correlations among some of the fields of study.

The IGY program did not spring into being suddenly. It had a period of gestation of more than 7 years while the two International Polar Years of 1882-83 and 1932-33 established precedents. Both of these events were rather limited in the subjects investigated and in geographic coverage. Emphasis was placed on studies in the high northern latitudes. In the first effort, surface meteorology, geomagnetism and the aurora were observed: the Fritz charts that delineated the aurora borealis were perhaps the most significant achievement of the First Polar Year. The same studies were repeated during the Second Polar Year with the addition of ionospheric physics, and data in this field probably represents the most significant achievement of that endeavor.

These successful experiences in international scientific cooperation and the value of the the results obtained thereby established the background for the current IGY, which had its genesis at the home of Dr. J. A. Van Allen in Silver Spring, Maryland, on the evening of April 5, 1950, where a small group of geophysicists met informally. In the inevitable discussion of the status of geophysics that followed, Dr. L. V. Berkner proposed a venture similar to the preceding Polar Years. This proposal, considered and expanded during several international scientific meetings during the next two years, became the IGY during the General Assembly of the International Council of Scientific Unions in October 1952 when the Comite Special de l'Annee Geophysique Internationale (CSAGI) was established.

The first full assembly of CSAGI was held from June 30 to July 3, 1953, and 9 nations sent scientific delegates to begin analyzing reports and proposals from 21 national committees and other scientific institutions. Studies in 10 disciplines were outlined at this time: aurora and airglow, cosmic rays, geomagnetism, glaciology, ionospheric physics, longitude and latitude, meteorology, oceanography, solar activity, and world days. At subsequent CSAGI assemblies several additional fields of activity were included in the program: gravimetry, seismology, rockets, and satellites.

The scope of the present program is suggested by the following statistics: Some 8,000 scientists, observers and technicians are involved in the effort and there are about 1200 stations and observational sites ranging from pole to pole and around the earth.

For convenience the IGY program may be considered in three groupings: First, the physics of the upper atmosphere, including solar activity, aurora and airglow, cosmic rays, geomagnetism, and ionospheric physics. Second, the heat and water budget of the earth, which encompasses meteorology and climatology, oceanography, and glaciology. Third, such aspects of the earth itself as are suggested by the disciplines of seismology, gravimetry, and latitude and longitude determinations.

[1]Hugh Odishaw, Executive Director, U. S. National Committee for the International Geophysical Year, National Academy of Sciences, Washington, D. C.

In addition, the IGY also includes two important areas of effort—the rocket and satellite programs—which are not disciplines but represent powerful tools for studying directly the particles and radiations impinging upon the earth from the sun, the stars, and the interplanetary medium. One of the vexing problems in studying these particles and radiations in the past has been our dependence upon indirect measurements, or upon surface measurements of secondary phenomena. In large measure the atmosphere of the earth behaves like a masking agent, absorbing and secreting physical occurrences at high altitudes. While this is a useful property of the atmosphere in some ways, for it protects life from certain destructive radiations, it has made difficult our understanding of many high-atmosphere phenomena.

Rockets and satellites permit scientists to carry measuring devices directly into the region of interest. During the last decade considerable knowledge has been gained of the upper atmosphere using research rockets. The discovery of X rays in the ionosphere affords one example. Rockets, however, are limited in their geographic coverage and in time duration. Essentially rockets cover a point region above the launching site or a very small cone, and the total effective measuring time of all rockets fired during the last decade can be reckoned in minutes.

These limitations are large responsible for the CSAGI recommendation that thought be given to satellite research vehicles. In this sense satellites represent an extension of rocketry, and it was with this in mind that Dr. Joseph Kaplan, chairman of the U. S. National Committee, gave the name LPR—Long Playing Rocket—to the Academy's IGY satellite program during the first 10 months of planning of this program (October 1954-July 1955). The USNC-IGY satellite program provides for the launching of several satellites during the IGY. The orbit will be inclined 35 degrees to the equator so that the satellite will traverse a region of the atmosphere some 35 degrees above and below the equator. As the earth rotates beneath it, the satellite will gradually, with every revolution, regress some 25 degrees. Travelling at about 18,000 miles per hour, the satellite will rotate once about the earth every 90-100 minutes and will have a perigee of about 300 miles and an apogee of some 800-1500 miles.

A successfully-placed satellite will have a life-time anywhere from about one to nine years, depending upon the density of the high atmosphere. The broad regional coverage and the long duration of satellites will permit the study of space- and time-dependence of events occurring at satellite altitudes. The perigee and apogee distances indicate that phenomena above the masking layers of the atmosphere can be measured directly. Satellites will not, however, displace rockets: for one thing, rockets provide the only tool for measuring the altitude-dependence of various physical phenomena.

Aside from a look at the IGY from a discipline point of view, one might examine the geographical coverage. Effective coverage is ensured by the participation of the 61 countries, and an imposing network of stations in the various fields has already been established. The USNC-IGY program includes operations in several regions of the earth: (i) the high northern latitudes, including work in the Arctic Basin, Alaska, and in Canada in cooperation with Canadian scientists; (ii) in the United States; (iii) in Central and South America where some research is being conducted in collaboration with our colleagues in several nations; (iv) in the Atlantic and Pacific Oceans; (v) on several islands of the Far West Pacific; and (vi) in Antarctica where six scientific stations have been set up, one in cooperation with New Zealand, and an air facility at McMurdo Sound.

Although the IGY began on July 1, 1957, considerable operational activity was undertaken long before then. Work in the Antarctic began with the reconnaissance mission of the USS ATKA during 1954-55. One year later, Navy Task Force 43, supporting the Academy's IGY Antactic program, established the Little America Station and the air facility at McMurdo Sound. During 1956-57 Task Force 43 installed the remaining US-IGY stations: ship and shore operations saw the installation of the Wilkes Station on the Knox Coast and the Ellsworth Station on the Filchner Ice Shelf of the Weddell Sea; an Air Force group

*continued on page 81*

## MENDENHALL DIES

W. C. Mendenhall, former director of the U. S. Geological Survey, died on June 3 at his Washington, D. C., home at the age of 86. Mr. Mendenhall retired in 1943 after serving on the U.S.G.S. staff for 48 years. During his career, he served the profession in many important capacities. He was secretary of 16th. Int. Geological Congress, was president of the G.S.A. and a vice president of the A.A.A.S. The Society of Economic Geologists awarded him the Penrose Medal in 1944.

# IGY and its significance to EXPLORATION GEOPHYSICS

by Paul L. Lyons[1]

The International Geophysical Year will write a ticket to the future of our exploration of the earth, the sun and the moon. Indeed, "sun" physics and "moon" physics are scheduled to play an important part in the mass of data that will be assembled. As for exploration geophysics, it will receive some very real and immediate benefits from the observations and results; however, it is highly probable that the long range aspects will be most beneficial to exploration and in ways that we cannot foresee at the present time. For example, who can foresee what minerals we will be seeking?

Among the immediate, tangible results will be data from beneath the ice of Antarctica. The odds favor the chance that this polar continent, also, will contain large deposits of hydrocarbons, uranium and other useful minerals. The planned seismic and gravity programs will almost certainly give some clue as to the presence of sedimentary basins and perhaps even indications of anticlinical structures beneath the ice cap.

It is quite likely that complete gravity and magnetic maps of the entire earth will be available as a result of the observations made during the IGY, for the force fields of the earth will be intently studied. At present, the interpretation of magnetic and gravity observations in terms of the earth's crustal structure still leaves much to be desired, and almost certainly new light will be thrown upon structure making processes in the earth's crust and their effect on gravity and magnetic fields. Already it is known, for example, that the thick crust once so confidently thought to underlie the continents is indeed perhaps no thicker than that under the oceans. The distribution of heavy and light masses in such a crust poses many problems for the structural geologist as well as for the geodesist.

### Energy

The day is not too far distant, it has been predicted, when energy is free to mankind. It will be derived from the sun and from elements present in the earth's crust—and perhaps in the moon's crust. The moon is a naked spheroid free of sedimentary deposits, so that its Archean surface will be a fertile ground for mineral exploration when the first ships come to rest on its surface, and selenology and selenophysics will come into their own.

A number of fascinating questions may be answered which could have long range aspects in the exploration of the earth. . . . How does solar radiation vary? Its variations may have had a part in the prolific generation of oil at certain times in geologic history. What is the nature and cause of the mysterious electrical current systems in the upper atmosphere, measured in hundreds of thousands of amperes? Can this energy be used? Are the auroras truly due to bombardment of the atmosphere by protons from the sun? What is the nature of their travel through space? Can man create artificial auroras and light entire cities by night? Is there a theory to explain the "dawn chorus," applied to mysterious "whistlers" and "swishes" of natural audio frequency radio waves? What is the origin and nature of tremendous solar flares which have such a telling effect on the earth's weather? Will the monitoring of the sun's surface enable us to make better weather forecasts? Can we map the tremendous "jet streams" of the earth's upper atmosphere? . . .

Cosmic rays will receive a share of the studies, and they may afford some insight into the most profound questions asked by man about the origins of the universe. . . . Is there truly an asymmetry of cosmic ray direction? Does such a variation afford a knowledge of the earth's absolute motion through space or "ether"? Is matter being

[1] Paul L. Lyons, Chief Geophysicist, Sinclair Oil & Gas Co., Tulsa, Oklahoma. A former president of the Society of Exploration Geophysicists and a director of the American Geological Institute, Mr. Lyons is widely recognized as one of the leading petroleum geophysicists.

continuously created from energy, or is there a gradual conversion of all matter to energy? . . .

Even continental drift will again have its day in court. Astronomical longitudes and latitudes will be precisely observed to afford proof or denial of any station's relative shift. Positions of the moon will be observed for geodetic purposes. For a baseline, the distance from Washington to San Diego has been measured, no small task. In theory, the three coordinates of an observer from the center of the earth can be made from two observations of the moon on the same night, and one of the quantities to be found for each station is its distance from the center of the earth. By using twenty such stations, the size and shape of the earth will be determined. Is the equatorial section circular or elliptical? Are there any "bumps" on the earth's surface?

### Time

By far the most fascinating inquiry will be that into the nature of time itself. Actually, we have two different kinds of time. One is Ephemeris Time, based on the action of gravitation, for example, the rotation of the earth, or the motion of a pendulum. Another type of time now available to man is Atomic Time, based on electrical forces affecting the atom. Now—are these two measures of time the same? The answer is "yes" only if the ratio of a unit of one time to a unit of the other is constant. A possible corollary of such observations is solution of the question as to whether or not the earth is shrinking. If it is, its angular velocity, like that of the skater who pulls in his arms, will be increased, and the day will shorten in length. Is the universe itself truly expanding? How true are some of the implications of Einstein's theory? Perhaps time will tell.

Getting back to earth, what is the volume of the earth's glacial ice? Estimates now vary from 10 to 20 million cubic kilometers. Is this land locked ice melting or increasing? If it melts, sea level could rise several hundred feet. Is the tremendous volume of $CO_2$ being released by man into the atmosphere calculated to raise the average temperature, melt the ice, and inundate our coastal areas? Or are we still in the glacial age and plunging again into a colder epoch? Glacial ice and the sun may provide these answers.

The oceans present many problems hitherto unsolved and unappreciated. Island observatories will probe the known 5 to 15 minute oscillations of sea level, the 3.84 day oscillations, and the long period seasonal changes. Why is sea level one-half foot lower in the spring season of a hemisphere? What is the nature of the deep circulation of ocean bottoms which is always northward?

Of course, the most spectacular observations will be those made by rockets and the artificial satellites. Direct results to exploration geophysics will perhaps be limited to their observations of the electrical current rings, the distribution of the magnetic field, and possibly the distribution of mass in the earth's crust along the orbital track of the satellite. After all, the satellite itself will be the ultimate so far attained in geophysical instruments. Its instrumentation alone will be of tremendous value to exploration geophysics.

## *Wedding Bells Ring For AGI's Barbara Fenton*

*photo by Glogau*

Wedding bells rang on June 29 for AGI's attractive Barbara Fenton, who married West Pointer Ted Felber at Fort Myer Chapel, Arlington, Va. Barbara, daughter of Col. and Mrs. Bryan C. Fenton, had been on the Institute staff for nearly four years.

When, in 1955, both Dr. Hunt, Executive Director, and his secretary, Mrs. Gregory, left AGI before the new Director arrived, it was Barbara who stepped in to handle Institute business. Her assistance in orienting and aiding the present Director cannot be over-emphasized. She was most dedicated and loyal to the Institute and it goes without saying that her cheerful presence will be missed by her associates at AGI.

To Barbara, an "Army brat," the transient life of service people will not be new. The newly-wedded Felbers will be stationed at Fort Benning, after which they will leave for a tour of duty in Germany.

# Some Geological Aspects of the Oceanographic Program of the IGY

by GORDON G. LILL[1]

Considerable attention has been given to most of the programs of the International Geophysical Year both in the scientific literature and in the press. One aspect of importance which has been overlooked is the significant contribution which the IGY will make to geology.

Although this article will be concerned largely with the oceanographic program it will be pertinent to mention briefly some of the other programs of the IGY which have geological overtones.

Even though the successful launching of an artificial earth satellite will stimulate man's space consciousness for centuries to come, it is equally exciting to note from another viewpoint that satellites eventually will help to determine accurately the shape of the earth, an accomplishment of as much geological as astrophysical consequence.

The Latitude and Longitude program should help to decide whether or not there is anything to the old Wegnerian theory of continental drift. Indeed, the program will fix the distance between continents to within about 100 feet, thus slicing 1,400 feet off the best known estimates of today.

The Antarctic program will divulge new and useful information on the geology and structure of the continent of Antarctica. Already it has been learned, for instance, that at the Byrd Station the ice thickness is about 9,000 feet with an elevation above sea level of only 5,000 feet.

Of equal interest to geologists are certain parts of the oceanographic program of the IGY. For eighteen months the research ships of over twenty nations will be mapping the ocean floor, measuring its heat output, sampling the sediments, and probing the sediment structure and that of the basement beneath by seismic means. Nearly 70 ships will be involved in this tremendous undertaking leaving only the most inaccessible portions of the ocean basin untouched.

For the first time since the German METEOR expedition of 1925-27 research ships will enter the southern Atlantic to map the bottom structure and topography with accurate seismic techniques and precision depth recorders. As an initial phase of this work the research ship VEMA of the Lamont Geological Observatory has just completed an epic cruise from South America, across the Atlantic, to Capetown, South Africa. Results are not yet available from the cruise, but dispatches indicate that it was successful. To those familiar with the scientists and crew of the VEMA, this means thousands of feet of precise seismic and echo sounding records.

### HEAT FLOW MEASUREMENTS

A new technique of studying the ocean basin which will be utilized during the IGY is the difficult business of measuring the heat flow through the deep sea floor. Sir Edward Bullard, with the assistance of Arthur E. Maxwell, perfected the method at the Scripps Institution of Oceanography. Lately, Maxwell and Revelle have continued the measurements in the Pacific while Bullard has been at work in the Atlantic. The technique involves the time consuming procedure of lowering a probe into the sediments of the ocean bottom. After allowing 30 or 40 minutes for the probe to reach equilibrium, the temperature difference between points near the top and bottom of the probe is measured by a thermistor bridge and amplifier and recorded on deck. (Bullard et al 1956.)

The geological implications of heat flow from the interior through the surface of the earth are many. Some which come easily to mind include the information gained regarding: the nature of the Mohorovicic Discontinuity; the nature of orogenic processes; and the origin of the deep, V-shaped oceanic trenches with related island arcs and volcanoes.

[1] GORDON LILL, present head of the Geophysics Branch, Office of Naval Research and Chairman of the Technical Panel on Oceanography of the U. S. National Committee for the International Geophysical Year 1957-1958.

Geologists are aware of the importance of the water cycle in geologic processes, but it is not so widely realized that about $5 \times 10^{18}$ grams of water is not accounted for. This is the difference in total mass of all oceans between October and March, and the water appears to be missing in March. Somewhere in the cycle the water has been lost. Oceanographers hope to find it during the IGY through a world wide system of sea level measurements. It is noted thus far that recorded sea level is lower by about 6 inches during the spring of both hemispheres than it is in the fall. (Pattulo, et al 1955.) From present data it cannot be determined whether this involves flow of water masses across the equator, or between the fringes of the ocean basins where nearly all tide stations are located, and the central portions where observations are inadequate. Furthermore, there is some evidence that the oceans as a whole contain less water in March than in September. While there would seem to be no difficulty in the capacity of continents to store the seasonal differential in the form of snow, ground water and vegetative matter; it is of broad geological importance that our inferred knowledge of the water cycle be proved.

### Age of Ocean Basins

The age of oceanic basins will never be agreed upon until a bore hole is carried to the Mohorovicic Discontinuity. However, the IGY program of coring the sediments of the oceans, and mapping the topography will contribute to a solution of the matter. Cretaceous corals are found on flat tops of many Pacific sea mounts, Eocene foraminifera were found just above olivine basalt under Eniwetok, and some isolated pockets of sediments in the Mid-Atlantic ridge contain Cretaceous fossils as well. It is to be expected that further exploration and accurate topographic mapping will turn up evidence for, or against, the Cretaceous age of the deep oceanic basins.

Because of these aspects of the International Geophysical Year, geologists will be participating in, and watching with careful attention, the largest international scientific program ever attempted. If one-third of the scientific data collected proves useful, the effort expended will have been worthwhile.


**References:**

**Bullard, E. C., Maxwell, A. E., and Revelle, R.** ***Heat Flow Through the Deep Sea Floor.*** **Advances in Geophysics, vol. III, 1956. Academic Press, Inc.**

**Pattullo, June; Munk, Walter; Revelle, Roger; Strong, Elizabeth.** ***The Seasonal Oscillation in Sea Level.*** **Journ. Mar. Res. 14(1), June 30, 1955.**


***Half way to goal***

## COMMITTEE OF ONE HUNDRED FOR AGI GROWS

In the June issue of GeoTimes we published a list of 41 persons who had pledged membership to the Committee of One Hundred for AGI. Since that time the following new members have been added:

*H. G. Doll*
*G. Donald Emigh*
*Michael T. Halbouty*
*R. N. Hunt*
*J. B. Lovejoy*
*Arthur A. Meyerhoff*
*Noyes D. Smith, Jr.*

Members of the Committee pledge to contribute $100 a year, or the equivalent in securities or royalties, for five years in support of the Institute. Persons interested in joining the Committee, thus aiding the Institute in its long-range efforts to get on a more firm financial footing, may *write to the American Geological Institute, 2101 Constitution Ave., N.W., for pledge forms.* Contributions to AGI, a non-profit organization, are tax-deductible.

## JOHN HAY WHITNEY GRANT TO SHIDELER

Dr. William H. Shideler, retired head of the Geology Department, Miami University, Oxford, Ohio, has been awarded a John Hay Whitney Foundation grant for the coming academic year. Dr. Shideler is one of the first physical scientists to receive a Whitney Foundation grant. Each year 10 recipients are selected from candidates nominated from more than 700 colleges and universities. The John Hay Whitney Foundation sponsors this program of annual grants in aid in bringing prominent, recently-retired professors to the campuses of the smaller colleges. Dr. Shideler will go to Hiram College where he will serve as a special lecturer and will organize a geology department. Several years ago Shideler was given the Neil Miner Award by the AGT in recognition of his outstanding ability as a teacher.

Early in June 200 former students and friends gathered on the Miami campus to honor Dr. Shideler. At this time, the creation of the W. H. Shideler Fund was announced. Dedicated to advancing geological studies and research at Miami, the fund, as a result of founding contributions of friends, companies and former students, had reached $2,500.

***Former president SEGp & AGI***

# Eckhardt Named Assistant Director of National Science Foundation

**The appointment of Dr. E. A. Eckhardt,** geophysicist, as Assistant Director of the National Science Foundation for the Division of Mathematics, Physical and Engineering Sciences was announced recently by Dr. Alan T. Waterman, Director. Dr. Eckhardt is well known to GeoTimes readers as a past-president and director of the American Geological Institute and for his capable leadership of the very important AGI Finance Committee.

Dr. Eckhardt has been one of the world's pioneers in geophysical prospecting for petroleum. As early as 1920, before a colloquium of geologists at the U. S. Geological Survey, he gave a talk on geophysical prospecting, probably the first of its kind in this country. He played a major role in the development of the geophysical activities of the Gulf Research & Development Company, an organization that enjoys a world-wide reputation for its research in this field. Most recently he has been engaged in the application of geophysical techniques to prospecting for deposits of solid minerals.

E. A. Eckhardt was born in Cedarburg, Wisconsin, in 1888. His advanced education was obtained at the University of Pennsylvania where he was awarded a Bachelor of Science Degree in 1908 and a Ph.D. in 1912, both in the field of physics. From 1912 to 1913, as Harrison Research Fellow, he studied at the University of Göttingen, Germany, after which he returned to the University of Pennsylvania as Assistant Professor of Physics, a post he held for four years.

In 1917 Eckhardt left the University to join the staff of the National Bureau of Standards. His eight years at the Bureau were notable ones. He proposed, built, and installed the first radio-acoustic ranging equipment for the U. S. Coast and Geodetic Survey, a system which, although greatly improved in detail, remains basically the same today. He also developed for the Survey a radio time recorder that greatly facilitated gravity measurements; devised methods and equipment for the accurate determination of the speed of sound in sea water; and contributed significantly to the fundamental knowledge of the acoustics of rooms, particularly auditoriums.

Dr. Eckhardt left the Bureau of Standards in 1925 to accept the appointment of Assistant Chief of Research of the Marland Oil Company, where for three years he directed his efforts toward the development of new and better geophysical techniques.

In 1928 he joined the staff of the newly formed Research Department of the Gulf Production Company, in Pittsburgh, as Staff Geophysicist and later became Assistant Research Director. Here he was directly responsible for the development of improved pendulum instruments for making relative gravity measurements in the field which, until superseded by the gravimeter, provided the most precise and rapid measurements available at that time.

In 1933 Gulf's research group at the Craft Avenue Laboratory became the Gulf Research & Development Corporation, a subsidiary of the Gulf Oil Corporation. Under Dr. Eckhardt's direction Gulf has won international recognition as a leader in the use of gravity, magnetic, and seismic techniques for petroleum prospecting. Eckhardt's original handful of geophysical pioneers has become an organization of over 1300, with operations on four continents. In 1941 Dr. Eckhardt was named Vice President of the Gulf Research & Development Company, in 1947 Vice President of the Dominion Gulf Company, and in 1952 Associate Director of Gulf Research.

Dr. Eckhardt contributed to the development of several significant war devices through military research at the Bureau of Standards during World War I and for the

***Lehigh Geology Benefits***

## A FIRE IS BETTER THAN THREE MOVES

In January, 1956, fire destroyed or damaged part of the Department of Geology quarters at Lehigh University. Rather than simply restore the building to its former state, the Administration added a new fourth story and renovated the other floors. New furniture and equipment have been installed. The Department now occupies the entire fourth and most of the third floors plus shop and storage room in the basement and weather station on the roof. In all, about 30,000 square feet are in use. Adequate laboratories and classrooms have been made available plus staff offices, rooms for graduate students and special research laboratories. A library and map room on the fourth floor are among new acquisitions. In preparing the new quarters, Lehigh has looked ahead for the next ten or twenty years, anticipating a rising enrollment in earth sciences, particularly on the graduate level.

A room dedicated to use of the students has been named the *Joseph Barrell Room* after the famous Lehigh-trained geologist. The *B. L. Miller Laboratory* (economic geology) and the *A. Henry Fretz Laboratory* (mineralogy and petrology) are named after former members of the geology faculty.

---

National Defense Research Committee during World War II. He has been a lecturer in petroleum engineering in the Graduate Work in Industry Program of the University of Pittsburgh.

Dr. Eckhardt has been associated with and has taken an active part in many scientific and technical societies. He is a past president and recently an honorary life member of the Society of Exploration Geophysicists; past president of the Terrestrial Magnetism and Electricity Section of the American Geophysical Union; past president and member of the Board of Directors, American Geological Institute; a fellow in the American Physical Society, the Physical Society of London, the American Association for the Advancement of Science, the Washington Academy of Sciences, and the Acoustical Society of America; and holds membership in the American Petroleum Institute, the Franklin Institute, the American Association of Petroleum Geologists, the American Institute of Mining and Metallurgical Engineers, and the Canadian Institute of Mining and Metallurgy.


by Robert L. Bates

On March 24, 1956, the SATURDAY REVIEW announced a new series of articles, entitled *"Science and Research."* It promised to show the "great connection between the Scientist and the Citizen" and "to remind the non-scientists that Science is intimately shaping and moving their lives from day to day." "We intend," stated the editors, "to document our observation that science is not only relevant to a creative culture but is indeed a vital part of it."

In the 15 months since these brave and cheering words appeared there have been authoritative reports on human genetics, the Salk vaccine, food and cancer, and cosmic rays; earth satellites, rockets, and missiles; science and ethics, science and conscience, and where science is taking us; molecular biology and *"What Hope Does for Man"*; and, almost to the point of Bohrdom, about the atom. Who could ask for anything more?

Well, you know who could. A careful review of the series reveals not one rock-hammerin', well-loggin', datum-pickin' word about geology. The closest approach to such a word was an article on the International Geophysical Year, which was titled *"Sea, Ice, and Rainwater,"* and didn't come very close.

As a side feature of the series, many eminent scientists have been asked to give their views briefly on problems that they think need more work—*"New Areas for Fruitful Research."* As of June 1957, geologist no. 1 had yet to appear in this group. If the magazine's readers conclude anything about geology, it must be that it is a sort of marginal or step-science that produces no newsworthy research and has all its problems solved.

In the name of E. L. DeGolyer, late SATURDAY REVIEW board chairman, why is this? Is it a conspiracy? Is it because geology really doesn't have any impact on the life of the non-scientist? Is geology not in fact "relevant to a creative culture?" Is it because rocks and minerals are dead?

REWARD—For a brief, *printable* answer to these questions, this department will award a "golf-ball" concretion of *dahllite* from the Thermopolis shale of Wyoming. Send your entries to *Contest Editor* R. L. Bates, Department of Geology, Ohio State Univ., Columbus, Ohio.

# MANPOWER *in a column —*

By HOWARD A. MEYERHOFF
*Scientific Manpower Commission*

In May 1956 we asked whether field exploration is research. The question was prompted by a decision of the Bureau of Labor Statistics, acting for the National Science Foundation, to adopt a definition of research that expressly excluded geological and geophysical exploration. The definition, which was thought up by Harvard's Graduate School of Business Administration, was dictated by expediency, simply because manpower and money used in field operations are not directly comparable to personnel and costs in laboratories.

Earth scientists were shocked to discover in NSF's report on "Science and Engineering in American Industry" that only 7.1 percent of the profession is, according to the Harvard concept, engaged in research. The AGI and SMC felt that, in justice to the profession, the Bureau and the Foundation should revise the definition, for if comparability of research and development effort between and among the professions is their objective, it could never be attained on the basis of a definition based primarily on expediency.

Following interviews with top exploration personnel in several oil companies, NSF and BLS asked the American Petroleum Institute to appoint a committee to help resolve the issue. *Hollis D. Hedberg*, of Gulf Oil Corporation, representing AAPG, was named chairman. Other committee members were *W. A. Bruce* (API), *L. Laskaris* (API), *H. A. Meyerhoff* (GSA), *William Pecora* (USGS), and *Olaf Rove* (SEcG). Although asked, the Society of Exploration Geophysicists did not have a representative at the meeting with NSF and BLS personnel on May 15. By invitation, R. C. Stephenson (AGI) also was present.

It was unanimously agreed that the Harvard definition was in error in excluding geological-geophysical exploration from research and development and was responsible for misleading statistics in the earth sciences. The committee prepared a set of definitions of research, applied research, development, and research-development for BLS use in gathering statistical data in the mineral and oil industries. With research defined as "investigation for the acquisition and/or advancement of scientific knowledge"—for direct commercial objectives, if "applied"—oil and mining company executives will have to keep in mind that development is "the work required to prove the results of research up to the point of decision for exploitation."

With these definitions accepted, it is believed earth scientists can anticipate statistics surveys that will not simply do them justice, but will permit valid comparisons with research in other fields.

## BUCHER IS HONORARY LECTURER AT CALGARY

Dr. Walter H. Bucher, Professor Emeritus, Department of Geology, Columbia University, presented the Second Annual Honorary Address of the Alberta Society of Petroleum Geologists in Calgary on May 23. More than 425 persons attended the lecture to hear Dr. Bucher's address, *"The Problem of Orogenesis in the Light of New Field and Experimental Evidence."* His presentation was characterized by his usual contagious enthusiasm and sparkling friendliness.

Society President John A. Downing was Chairman of the meeting and the Citation was made by Dr. P. S. Warren, Professor Emeritus, University of Alberta. Following Dr. Bucher's address, Dr. George S. Hume, former Director of the Geological Survey of Canada, expressed the appreciation of the Society for his interesting and thought-provoking lecture and presented him with a painting of Mt. Rundle by the well-known Banff artist, Walter J. Phillips.

### Offshore Summer Institute for Industry at Texas A & M

The Department of Oceanography and Meteorology, in cooperation with the C. E. Department at Texas A. & M., will offer a special summer course at College Station, Texas, September 3-13. The course will provide engineers and scientists from industry, who are involved with coastal structures or offshore operations, opportunities for supplementing their knowledge of basic coastal engineering. Topics included will cover wave characteristics and forces, ocean currents and tides, oceanographic meteorology and structural design in offshore engineering. No credit will be offered for the course. Details concerning the course enrollment, fee, housing, etc., may be obtained by writing to *Mr. Richard M. Adams, Adm. Asst., Dept. of Oceanography and Meteorology, A. & M. College of Texas, College Station, Texas.*

# IUGG—Toronto, September 3-14

The Eleventh General Assembly of the International Union of Geodesy and Geophysics will meet at the University of Toronto from September 3rd to 14th, 1957. The IUGG was formed at a meeting held under the aegis of the League of Nations in 1919 in Brussels by the amalgamation of still older associations. General Assemblies of the Union normally are held every three years. Seven General Assemblies were held before the last war—at Rome, Madrid, Prague, Stockholm, Lisbon, Edinburgh and Washington. The first post-war General Assembly was held in Oslo in 1948, and this was followed by meetings at Brussels and Rome. The Union thus has met only once outside of Europe, and it is unlikely that Canada will again in our lifetime have the honor of acting as host country to the Union.

At present, forty-eight countries belong to the Union, and any country may apply for membership. The meetings at Toronto are being planned for an estimated 1500 scientists, and large delegations are expected from Russia, many European countries, Canada and the United States.

The Union comprises seven associations, one dealing with Geodesy and six others, each dealing with a particular branch of Geophysics. The details of the scientific programs are the responsibility of the Secretary of each association. The programs are now complete and details concerning them will be given in the Second Circular which will be distributed about the middle of June. Every member of the American Geophysical Union will receive a copy of the circular. Special features of the meetings will be the large number of symposia that will be held on topics of special interest, and joint meetings between two or more associations.

The International Association of Geodesy (IAG) will, as before, maintain its five sections, viz. Triangulation, Precise Levelling, Geodetic Astronomy, Gravimetry and Geoidal Studies. No two sections will meet simultaneously.

Seismology and problems relating to the interior of the Earth are dealt with by the International Union of Seismology and Physics of the Interior of the Earth (IASPEI). Other associations are the International Association of Meteorology (IAM), and the International Association of Geomagnetism and Aeronomy (IAGA). Aeronomy is the study of the physics of the upper atmosphere. Oceanography is covered by the International Association of Physical Oceanography (IAPO)—the word physical is used to emphasize the physical as distinct from the biological nature of the field dealt with by the association. The International Association of Scientific Hydrology (IASH) has special commissions on surface waters, subterranean water, continental erosion and ice and snow. The seventh association is the International Association of Volcanology (IAV). As it is impossible to give details of all the scientific programs, only the topics of some of the special symposia are given below:

IASH, IAM, IAPO
Water Balance

IAPO
General Circulation of the Ocean

IAGA, IASPEI
Rock Magnetism

IASPEI, IAV
Geochronology and Radioactivity

IASPEI, IAV
Physical-chemical interpretation of terms, magma, crust and substratum

The Toronto Arrangements Committee under the chairmanship of Dr. J. T. Wilson is in charge of purely local arrangements, social events and excursions. There will be a reception on the opening day, September 3rd, at the Royal Ontario Museum, and a closing soirée on September 13th at the Royal York Hotel. There will also be a special concert, a film showing by the National Film Board of Canada, an exhibition of paintings of British Columbia glaciers and a visit to the Canadian National Exhibition. A Trade Exhibition has been organized with more than 30 companies from several countries showing geophysical equipment and methods. There will be no charge for any of the above events. Special excursions have been arranged to Niagara Falls, the Stratford Shakespearean Festival, and to Muskoka Lakes and Georgian Bay. A special ladies' program has been arranged for the wives and daughters of delegates and guests.

The meetings have an added interest in that they follow the launching of the International Geophysical Year (IGY). Two public addresses have been scheduled on two fields of particular interest. Dr. L. V. Berkner (U.S.A.) will speak on the Rocket and Satellite Program of the IGY and Mr. E. I. Tolstikov (U.S.S.R.) on the Arctic and Antarctic Program of the IGY.

Persons interested in attending the meetings should address all inquiries to: *Dr. J. A. Jacobs, 49 St. George St., Toronto, Ontario, Canada*

***September 8 - October 9***

# CANADIANS HOST TO COMMONWEALTH MINING & METALLURGICAL CONGRESS

One of the most important and comprehensive assemblies of representatives of the mineral industries ever to be convened in Canada, the Sixth Commonwealth Mining and Metallurgical Congress commences at Vancouver, B. C., on September 8th, 1957, and terminates at Halifax, N. S., on October 9th.

The Sixth Congress is being held with the approval of the Commonwealth Council of Mining and Metallurgical Institutions, representing ten technical and professional institutes throughout the Commonwealth, with an aggregate membership of 30,000 members. Host body for the Congress in Canada is the Canadian Institute of Mining and Metallurgy.

Above:
R. W. Diamond
Below:
Robt. A. Bryce

To date more than 400 registrations have been received from travelling delegates representative of 30 countries. It is expected that a total of 500 delegates will travel with the Congress on its cross-Canada tours and that participation by Canadians in local programs will total several thousands of registrations.

Principal objectives of the Congress are to provide suitable occasions and circumstances whereby mining engineers, geologists, metallurgists, scientists and many others concerned with the mineral industries and mineral resources can meet to discuss technical progress and problems; to exchange technical data, advice and information; to establish through personal contacts effective inter-communication between the industries and the professions in all parts of the Commonwealth; and to visit and inspect the mining and metallurgical installations of the host country.

Major meetings of the Sixth Congress will be convened successively in eight Canadian cities. Delegates will travel by chartered trains and planes from the Pacific to the Atlantic, and to northern Canada, to visit the important mining, metallurgical, petroleum, petro-chemical and other installations throughout the country. Aerial tours will take delegates by chartered aircraft to northern British Columbia, Yukon Territory, Northwest Territories, Northern Saskatchewan and Northern Manitoba. Other aerial tours will be made to Ungava-Labrador and to Newfoundland.

In addition to the attractive selection of low-cost tours and programs available in all parts of Canada, the Sixth Congress is publishing a series of five technical volumes prepared by the Technical Divisions of The Canadian Institute of Mining and Metallurgy. These will include "Mining in Canada"; Volume II of "Structural Geology of Canadian Ore Deposits" (Volume I was published by the C.I.M.M. in 1948); "The Milling of Canadian Ores"; "Canadian Non-Metallics"; and "Case Histories in Geophysics." It is expected that these technical volumes, available in September, will fill a long-standing requirement for a comprehensive and authoritative series of technical publications dealing with all aspects of Canadian mining.

The Sixth Congress plans to present major exhibits devoted to important aspects of the mineral and associated industries at Vancouver, Edmonton, Winnipeg and Toronto. Attractive local programs have been arranged for all of the major cities and at 40 smaller centers to be visited.

Honorary President of the Sixth Congress is the Right Honorable Louis S. St. Laurent, P.C., Q.C., LL.D., M.P., Prime Minister of Canada. R. W. Diamond of Trail, B. C., is President, and Robert A. Bryce of Toronto, Ont., is Chairman of the General Committee. The Sixth Congress is being convened with the active support and cooperation of the Government of Canada and the governments of the Canadian provinces. The Congress organization has enlisted the enthusiastic support of the entire Canadian mineral and metal industry and of many large manufacturing, supply and service companies closely associated with the mines, smelters, steel plants, and oil and gas companies.

Accommodation on some of the principal tours and for programs in the major cities is still available and the Sixth Con-

***West Texas Geologists***

# POINT TOWARD GEOLOGY MONTH IN SCOUTING

STARTING EARLY. These Midland Scouts recently made a week-end field trip to the Big Bend area as a part of their Geology merit badge requirement. The trip was sponsored by the West Texas Geological Society, and conducted by C. F. Dodge, chairman of the Boy Scout Committee (standing, left), assisted by R. W. Atkins (center), and W. G. Suddreth.

The Boy Scout Committee of the West Texas Geological Society is only a little more than a year old, but it is already immersed in an unusually active program. The committee, under the leadership of its chairman, C. F. Dodge, is carrying out a five-point program, which, as outlined at its first meeting in February 1956, is as follows:

1. An award for Scouts who have earned the Geology merit badge and have demonstrated outstanding Scouting ability. The award is presented each year to a Scout from each of the seven districts in the Buffalo Trails Council. The award includes a certificate and the payment of fees for one week at the Fort Davis Boy Scout Ranch.
2. The establishment of a permanent camp museum. The collections for the museum will be started by the Society and built up by the Scouts under guidance of their counselors in geology.
3. The procurement of geology kits for the use of Scoutmasters to further interest in geology and to facilitate the attainment of the Geology merit badge. Four kits, which contain specimens of rocks, minerals and fossils, have been presented to districts in the local council. Geologists have been recruited for advisors and to counsel for the merit badge.
4. Professional geologists are available for talks and geological leadership for all Scout units.
5. A long-term project to map the summer camp area, to provide a finished map for the Scout Ranch.

In addition 26 Scouts and Explorers attended four lectures in October on the Geology merit badge and in April, 14 boys were taken on a field trip into the Big Bend area.

The Society has obtained council contacts to coordinate plans for GEOLOGY MONTH for the Buffalo Trail and Yucca Councils. Also within their own council, geologists are working with district executives in seven of the eight districts. The Society has many geologists working with various Scout units "too numerous to mention." This activity is coordinated by the committee so that any unit within the council can obtain help with any phase of the geology program. Every unit leader in the council (more than 300) has been told by letter of the services available to him.

Chairman Dodge is assisted in this work by R. W. Atkins, Leon Ditzell, Tom Culbertson, and Dan Ward.

---

gress organization will be happy to receive registration applications or inquiries from interested technical and professional personnel. A substantial number of mining engineers and geologists resident in the United States have registered to participate in the Congress tours and programs, and additional registrations from these sources are encouraged.

Detailed information on tours, programs and costs is set forth in a recently published brochure that also incorporates registration form, tour application form and Sixth Congress publications application form. Copies of this brochure are available on request. All communications should be addressed to: *The Executive Secretary, Sixth Commonwealth Mining & Metallurgical Congress, 507-837 W. Hastings St., Vancouver 1, B. C., Canada.*

---

October 1957

## The Greatest Show on Earth

GEOLOGY MONTH

IN

SCOUTING

*Are you doing your part?*

## Popular Geology in Print

by Mark W. Pangborn, Jr.

***Books should be ordered by title and publisher from your local book dealer.***

Outstanding among the recent new caving books is *Franklin Folsom's* EXPLORING AMERICAN CAVES; THEIR HISTORY, GEOLOGY, LORE, AND LOCATION; A SPELUNKER'S GUIDE (*Crown*, 1956, $5). Readable and thorough, it includes much practical data, such as a chapter on equipment, lists of caves and caving organizations, and a glossary. IN CELEBRATED AMERICAN CAVES, edited by *C. E. Mohr and H. N. Sloan* (Rutgers University Press, 1955, $5), 30 or so well known caverns are described by speleologists familiar with them. *John Scott Douglas'* CAVES OF MYSTERY; THE STORY OF CAVE EXPLORATION (Dodd, Mead, 1956, $3) is a rambling but interesting compilation on how many of the world's caves were first explored.

For youngsters 8 to 12 is *Dorothy Sterling's* attractive and informative THE STORY OF CAVES (Doubleday, 1956, $3; the more brief FIRST BOOK OF CAVES by *Elizabeth Hamilton* (Watts, 1956, $1.95) is suitable for 7 to 10 year olds.

MAPPING THE WORLD, by *Erwin Raisz* (Abelard-Schuman, 1956, $3) fills a gap in the popular cartography literature. The first 60 pages of this delightful little book trace the evolution of important cartographic principles from the first map to the Cassinis; the remaining 50 deal with triangulation, charting the seas, photogrammetry, and the mapping of North America. *A. K. Lobeck's* THINGS MAPS DON'T TELL US; AN ADVENTURE INTO MAP INTERPRETATION (Macmillan, 1956, $4.95) is made up of about 70 two-page problems, each consisting of a base map, an explanatory physiographic diagram, and a text. The book is divided into four sections—coast lines, islands, rivers, and lakes—and provides examples of most types of land forms, drawn from all over the world. Lobeck's volume will intrigue any geography-minded person, age 13 up.

EDITOR'S NOTE: *This monthly column on popular literature in geology can be used to advantage by the profession in placing such literature in the hands of interested youth and layman, as well as in our schools and libraries.*

## BOOKS

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, *J. V. Howell, Coordinating Editor, 325 pages, cloth bound, available from American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C., June 1957, $6.00.*

A comprehensive glossary compiled by a group of more than 90 specialists covering more than 25 fields. A cooperative project of the American Geological Institute and its member scientific societies. Contains nearly 14,000 terms, many of which are brought together in one reference book for the first time.

GALACTIC NEBULAE AND INTERSTELLAR MATTER, *by Jean Dufay (translation by A. J. Pomerans), 352 pp., 1957, Philosophical Library, New York, N. Y., $15.*

A leading French astrophysicist presents a well-organized, comprehensive account of the diffuse matter in space, its chemical composition, physical state, and distribution. The volume was written primarily for the physicist and astronomer. Different sections have the character of: (a), a high-level "popular" exposition; (b), a text for the beginning graduate student; (c), an encyclopedia of nebulae; (d) an abstract of technical literature. Aspects (a) and (b) are usually lucid, precise and, so far as necessary, mathematical at a not very difficult level. Aspects (c) and (d) are often so detailed as to be confusing to the non-specialist. Part Three, entitled: "From atoms to grains and from grains to stars," skirts cosmogony but avoids its more speculative areas.

D. B. McL.

AMERICAN INSTITUTE OF PHYSICS HANDBOOK, *Sponsored by AIP, Dwight E. Gray, Coordinating Editor, McGraw-Hill Book Company, 1957, $15.00.*

A cooperative effort of more than 90 specialists under the sponsorship of the American Institute of Physics, divided into 8 sections as follows: 1, Mathematical Aids to Computations, 5 pp.; 2, Mechanics, 236 pp.; 3, Acoustics, 179 pp.; 4, Heat, 160 pp.; 5, Electricity and Magnetism, 297 pp.; 6. Optics, 123 pp.; 7, Atomic and Molecular Physics, 219 pp.; 8, Nuclear Physics, 253 pp.

Includes considerable geophysical data and other helpful information, so that it

will be a helpful reference book to both research geologists and geophysicists.

PHYSICS OF FLOW THROUGH POROUS MEDIA, *by A. E. Scheidegger, 236 pp., Macmillan Co., 60 Fifth Ave., New York 11, N. Y., 1957, $14.00.*

Geologists, hydrologists, and petroleum engineers will find this book a most welcome addition to the literature, inasmuch as it brings together the present knowledge of hydrodynamics in porous media. The author, a geophysicist at the Dominion Observatory, Ottawa, Canada, was formerly affiliated with an oil company, and has drawn heavily on petroleum engineering data. The book discusses properties of porous media and fluids, hydrostatics in porous media, Darcy's law, permeability, general flow equations and multiple phase flow. The book contains an extensive bibliography.

ADVANCES IN GEOPHYSICS, *Volume III, Feb. 1957, Edited by H. E. Landsberg, Academic Press, Inc., 111 Fifth Avenue, New York, N. Y. Price $8.80.*

This omnibus volume really has "something for everyone" and especially for every earth scientist. The seven papers, each by an authority in the field, span the breadth of the field which is geophysics. Physics of the solid earth is represented by three papers, "Subcontinental Structure in the Light of Seismological Evidence," "Heat Flow Through the Deep Sea Floor," and "The Interior of the Earth." Each contains a succinct review of the subject and a summary of recent research and conclusions. "Subsurface Geophysical Methods in Ground-Water Hydrology" is the only paper representing applied geophysics, in this instance geophysical well logging. "Recent Developments in the Study of the Polarization of Sky Light" covers a rather specialized aspect of atmospheric physics. "Arctic Ice Island Research" is an interesting and informative article on the history, methods and results of the recent studies made on T-3. The volume closes with a timely paper on "Geophysical Research with Artificial Earth Satellites." This introduction to the research potential of the most talked of feature of the IGY should be read by all earth scientists.

Each paper could fittingly be summarized by the quotation which appears at the end of one paper, "After all, the present results have clarified that the phenomenon which we observed and tried to interpret by means of experiment is not so simple."

C.J.R.

## ROCK CHIPS

by SANDSTONE SAM

*Dear Sandstone Sam:*

*I read with great interest your divining-rod advertisement (P2506) at the bottom of your monthly column in the May issue. It calls to mind a letter concerning lizards that could be calibrated to find ground water and that are far superior to electrical equipment. In order that lizards (Geol. Newsl., Jan. 1956) may still remain in the ground-water business and not be run out by electrical paraphernalia, I am enclosing my $1.00 and one more in hope that AGI will not advertise equipment that may force lizards out of work.*

*Paul C. Franks*
*Geologist*

NOTE: My boss (the Editor, of course) caught "you-know-what" from some readers who thought that he had teamed up with Henry Gross and Kenneth Roberts to put water-finding scientists out of work. However, geologists who have been unsuccessful in finding water at their suburban home sites, in the opinion of some, should give this gadget a try. Next time I, SaS, run such a notice, I will label it JOKE.

Sandstone Sam

• • •

*Enthusiast—the man who, having completely lost sight of his objective, redoubles his efforts.*

• • •

*In Crescent, Pennsylvania, the phone book lists four Quartz's, one of whom is Rose Quartz. There is also a Quartz Jewelry Store.*

---

## SCIENCE TEACHERS FELLOWSHIPS AVAILABLE

Approximately 60 fellowship awards will be made in October 1957 by the National Science Foundation to qualified college and university science teachers as a stimulus to improve the teaching of science, mathematics, and engineering in institutions of higher learning. Open to U. S. citizens with at least three years of teaching experience, the fellowships will carry a stipend essentially matching the regular salary of the recipient. Details and application materials may be obtained from *Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D. C.* Closing date is September 3, 1957.


DEAR EXECUTIVE DIRECTOR:

I am enclosing herewith a small contribution by the Geology Department at the University of North Dakota for the work of the American Geological Institute. While it isn't much it will indicate our continued interest in your program.

Kindest regards.

Sincerely yours,

WILSON M. LAIRD, Head
Department of Geology

DEAR EDITOR:

In the GeoTimes, I saw the publication of the extract of the first circular of the V INQUA Congress.

In the name of the Organization's Committee, I thank you very much for your kindness.

LOUIS SOLÈ SABARIS
Secretary, V INQUA Congress

DEAR EDITOR:

In a paper presented to the 38th Annual Meeting of the American Geophysical Union, Prof. Matt Walton provided us with an invaluable equation, $S = f(C,P)$, "the geologic equation . . . [which] will prove useful in testing the validity of geological arguments and clarifying geological terminology." (Program Abstracts, p. 36.) In this equation, *C* stands for information on configuration, *P* for information on processes, and *S* for "possible sequential arrays of past configurations and processes."

Carrying this equation a bit farther would increase its usefulness. Thus, the many applications of the same equation stated in the following form will be immediately apparent:

$$dS = \frac{\delta S}{\delta C}\, dC + \frac{\delta S}{\delta P}\, dP$$

In keeping with the progressive quantizing of geology would be the increasing of the definiteness of the equation. First, the symbols would best be modified to make their symbolism concrete and their numerical treatment easy. For *C*, configuration, substitute *m* for *mapping factor*, defined as $km^2 \times (km \text{ from New Haven}) \times (years\ spent)^{-1}$. For *P*, process, substitute *c* for *controls as interpreted by the geologist*, defined as column-inches of published theoretical papers. For S, sequential arrays, substitute *e* for *evolutionary stage*.

Using these symbols, Walton's indefinite equation becomes $e = f(m,c)$, which can be very closely approximated by

$$e = mc^2$$

This form not only has a considerable glamour value, but yields an answer with the useful units of $km^3 yrs^{-1} (col.\ in.)^2$; differential and integral forms are recommended for advanced students.

DR. LIVINGSTONE

DEAR GEORGE T.:

I confess to being completely a non-rock knocker, and supposedly receive GeoTimes just for the calendar (conveniently located on the first page). However, I find myself reading all the way through each issue, right to the back cover, including your appeals for help. My name isn't Aldredge, Alling, Atwater, Beers, Cram or Davis; I can't even count myself among your 10,000 geoscientists; but I am an avid GeoTimes reader and I wanted to drop you a line to tell you so.

Sincerely,

(MRS.) JACQUILYN J. VOLLMER
"Forthcoming Events"
Science-Scientific Monthly

*Enclosures: 2—Dirty but green*

DEAR SIRS:

Please send me several more copies of "Shall I Study Geological Science." I tune pianos and, in doing so, became acquainted with families who have children in Junior and Senior High Schools. A number of these people have expressed interest in reading your career (AGI) booklet. After giving them one, I ask them to pass it on to another interested friend. Thank you for the last supply.

JOHN M. DERTHICK
1308 San Andres Street
Santa Barbara, California

EDITOR'S NOTE: *If geologists would work to sell geology a fraction as much as our piano-tuning friend, Mr. Derthick, apparently does, perhaps we wouldn't have so many people asking—What is geology?*

**IGY**— *continued from page 7*

together with Navy air unit established the Amundsen-Scott South Pole Station by air drop; the Byrd Station at 80°S 120°W was established by tractor train and air drop operations; and finally the joint U.S.-New Zealand station at Cape Hallett was successfully completed by ships of the Task Force.

In the Arctic the most formidable operations activities were those concerned with the establishment of two drifting stations on the Arctic ice. The Air Force located Fletcher's Ice Island (83°N 99°W) and establish a station there during March-May 1957. The Air Force also located a suitable piece of pack ice at 80°N 159°W and established the second USNC-IGY station during April-May 1957.

Another area of importance in the USNC-IGY effort is the far western Pacific. Magnetometers are installed in a two-station, close net at Guam, and Koror in the Palau Islands. This net of stations is particularly important as it sits astride the geomagnetic equator. To extend further the coverage of the geomagnetic equator in the Pacific Ocean area three magnetographs have been set up at Palmyra, Jarvis, and Fanning Islands in the Central Pacific approximately 1,000 miles due south of Honolulu.

Plans have been completed for an optical satellite tracking station in the Hawaiian Islands. Arrangements have also been made for observations of the sun to be carried out by the University of Hawaii. This is particularly important as Hawaii can bridge the gaps in solar observations between those which will be made on our west coast and those of Japan. Cosmic ray intensity measurements will be made from Oahu. In seismology, equipment will also be installed in conjunction with the magnetic work at Truk, Guam, Koror and Palmyra. Meteorological observations long carried out at Hawaii will be continued as will also the ionospheric vertical soundings of the National Bureau of Standards. The Hawaiian Islands are one of the important locations at which the recently devised dual-rate moon position camera will be installed in the program for latitudes and longitudes.

Some of the regional operations provided an opportunity for preliminary research of value both in itself and as a guide to subsequent observations and measurements. For example, Dr. J. A. Simpson and his group at the University of Chicago, in cooperation with Canadian scientists, were enabled to conduct a cosmic ray experiment using a neutron pile detector on each of the Antarctic missions. The measurements of variation of cosmic ray intensities with latitude yielded data on the tilt of the geomagnetic equator with respect to the geographical equator and on the displacement of the axis. Dr. Simpson and his group were also to measure cosmic rays during the gigantic solar flare of February 23, 1956. The results from these measurements indicate that cosmic rays, at least on that occasion, were produced by the sun; the observed energies were about 30 billion electron volts. Moreover, analysis of these studies indicates the presence of magnetic fields in interplanetary space but with a field-free region somewhat longer than the orbit of the earth. Ionospheric studies at the National Bureau of Standards during the same solar flare yielded data linking ionospheric phenomena and cosmic rays for the first time.

Another example of pre-IGY research is provided by the test firings of rockets. Some of these were made by Dr. Friedman of the Naval Research Laboratory from a ship off the coast of Southern California. In one of these tests, a rocket was fired during a solar flare, an analysis of the data revealed for the first time the penetration of solar X rays to hitherto unexpected depths in the ionosphere.

The synoptic objectives of the IGY program require that simultaneous observations be made in most of the disciplines throughout the world. Schedules to achieve this have been arranged. For example, in meteorology radiosondes will be launched twice daily, at 0000 and 12000 Universal Time (UT). The vertical incidence sounding program in ionospheric physics calls for soundings at 0000, 0001 (high gain), 0005, 0015, 0030, 0045, 0055, and 0059 (low gain) every hour.

During some periods an intensification in the observational programs is desirable, and for this reason the World Days program was established.

There are three classes of special days or periods during which special experiments or intensified observations will be undertaken: Regular World Days, World Meteorological Intervals, and Special World Intervals.

World Meteorological Intervals (WMI) are series of ten consecutive days each in June, September, December, and March. They coincide exactly with two "pentades" of the World Meteorological Organization and always include either a solstice or equinox, periods during which intensified meteorological observations are most desirable, at least on a predictable basis.

Regular World Days (RWD) are three

or four days each month that are selected in advance. Two are consecutive days at the time of new moon; the others are at times of unusual meteor showers (Geminid, Perseid, Taurid, etc.), or near one of the lunar quarter phases. The RDW will also include the days of solar eclipse, with adjacent days for control purposes. For those types of observations which are insensitive to lunar phase or meteoric effects and for those observations which cannot be carried out continuously throughout the IGY period, the RDW should constitute a representative sample of the IGY period and the resulting concentration of effort should be useful in the interpretation of results in all disciplines.

Periods of Alerts and Special World Intervals (SWI) are designated on a day-to-day basis by the IGY World Warning Agency in the United States, acting with the advice of forecasting centers throughout the world. A period of Alert will be declared whenever solar activity is unusually high and significant geomagnetic, auroral, ionospheric, or cosmic ray effects are probable. During the period of Alert, an SWI may be declared (at 1600 UT to commence at 0001 UT the following day) whenever the probability is high that an outstanding geomagnetic storm, with associated effects in other disciplines, will begin within a few hours. The periods of Alert and SWI will continue in effect until terminated by the World Warning Agency. An effort will be made to predict only the most outstanding disturbances in the designation of the SWI; even if no very outstanding event takes place, it is almost certain that some other phenomena associated with solar activity will have taken place and thus have made the coordinated and concentrated observations worthwhile.

How the World Days will affect the programs can be illustrated readily in meteorology and ionospheric physics. In meteorology the twice-daily radiosonde ascents will be supplemented by rawin ascents at 0060 and 1800 UT for WMI and SWI. In ionospheric physics at these same periods, the hourly 0000 and 0001 soundings will be followed by soundings every 5 minutes thereafter or, at the discretion of the observer, continuously.

The combined schedules – the regular observational measurements and those intensified measurements during special periods, will combine to yield a large body of data: several decades of ordinary measurements are, in effect, compressed into the IGY eighteen-month period. The simultaneity of measurements in many fields, the extended geographic coverage, the scope of disciplines embraced, promise to provide science with a significant set of results, both in terms of the needs of each discipline and in terms of the inter relationships among fields.

## NEW *Ideas Products Services*

THE URANIUM OUTLOOK; A private report by Atoms for Peace discusses the why of Uranium, supply, production plans, producers and uranium securities. Contains 20 pages. Prepared by WHALEY-EATON CORP., *Munsey Bldg., Washington 4, D. C.*

WALKING MAGNETOMETER weighing 12 pounds has been developed for exploration to delineate magnetic anomalies and magnetic mineral deposits. Measures vertical component of earth's magnetic field. Can be hand carried and also operated from a non-magnetic boat. Write RADIAC CO., INC., *Room GX, 489 Fifth Ave., N.Y.C.*

MIGHTY MIDGET portable rotary vacuum/air exploration drill will drill to depths of more than 100 feet in dry formations without use of circulating water. Catches dust samples in Hi-Vac circulation system. Completely portable, weighs only 125 lbs. and is powered by 9 H.P. two cycle gas engine. Ideal for preliminary prospecting. Write ALLIED GEOPHYSICS, *P.O. Box 583, San Jose, California.*

DUAL RECTI/RITER, a new two-channel rectilinear galvanometric recorder featuring error-free trigonometric linkage to give true straight line writing motion. Has applications in power, meteorological, radiological, geophysical and general laboratory uses. Write for bulletin GTR-502 INDUSTRIAL INSTRUMENTATION DIV., TEXAS INSTRUMENTS, INC., P.O. *Box 6027, Houston 6, Texas.*

## CLASSIFIED ADS . . .

| | 1 ti. | 3 ti. | 6 ti. | 12 ti. |
|---|---|---|---|---|
| POSITIONS WANTED | $0.25 | — | — | — per line |
| VACANCIES | 2.00 | 1.35 | — | — per line |
| SERVICE-SUPPLIES | 2.00 | 1.35 | — | — per line |
| CONSULTANTS | 2.00 | 1.35 | — | — per line |
| ONE INCH BOX | 25.00 | 22.50 | 21.25 | 20.00 |

Min. Charge $1.00. AGI box numbers $1.00 extra. No discounts. All classified advertisers will be billed, do not send advanced payments. *Address all communications to American Geological Institute, 2101 Constitution Ave., Wash. 25, D. C.*

### VACANCIES

GEOPHYSICIST - MINING: Well-trained geophysicist, pref. 4-5 yrs. exper. mining geophysical techniques, calculations and interpretations. Work conn. large-scale geologic investigation and develop. mineral resources, California and Nevada. Field headquarters move every 4-5 months. Salary to $560 per month depending on exper. and qualifications plus monthly living expenses to about $230, single or married. Submit resume personal data, experience, references, availability to: Chief Geologist, Southern Pacific Company, Room 205, 65 Market Street, San Francisco.

MONTANA SCHOOL OF MINES, Butte, Mont. requires an Instructor and an Assistant Professor for September 1957. Applicants should have specialized in either mineralogy or paleontology. PhD. is preferred, but Master degree applicants will be considered. Possibility of summer employment in geology of Montana. Salary dependent on qualifications. Reply in full to office of President, giving qualifications and references.

DICKINSON COLLEGE, Carlisle, Pa. Instructor, general geology and laboratories and other undergraduate geology courses; also general chemistry laboratory; beginning September; master's degree required; doctorate and teaching experience desirable. Apply Dr. W. W. Edel, President.

MOUNT ALLISON UNIVERSITY invites applications for the position of Lecturer or Assistant Professor in Geology effective July 1, 1957, duties to commence in September 1957. Initial appointment will depend on qualifications and experience. Applications giving full particulars and references should be submitted to the Chairman, Department of Geology, Mount Allison University, Sackville, N. B.

KENTUCKY GEOLOGICAL SURVEY, University of Kentucky, Lexington, Kentucky. Opening September 1. Geologic editing, laboratory duties, and industrial mineral investigations. Graduate degree preferred. Starting salary $4,800-$5,400, depending on qualifications. Write State Geologist.

LORIDA STATE UNIVERSITY. Faculty additions authorized for September 1957 at level of Assistant Professor (Ph.D. required) and Instructor (Ph.D., or M.S. plus progress toward Ph.D.). Salary range $4500 to $6000 for 9 months. Persons available September 1957 or February 1958 qualified and interested in teaching and research, are invited to send full information on qualifications and specific interests, plus 3 references to: B. F. Buie, Dept. of Geology, Florida State University, Tallahassee, Florida.

### POSITIONS WANTED

BOX 292. GEOLOGIST, 36, B.S., married, 5½ years major company experience in the Four Corners and West Texas, including administrative, seismic and some surface work. Desires more responsibility. Excellent references.

BOX 302. ECONOMIC GEOLOGIST, PETROGRAPHER, Ph.D., employed, extensively travelled, trained in Mineralography, and Microchemistry as applied to the study of ores, possessed of functional knowledge of French, German, Spanish and geological literature, and experienced in teaching the major phases of Earth Sciences. Desires position in teaching, exploration, or research. Fellow of Sigma Xi Etc., very good references, and available July 1957.

BOX 304. Research Geophysicist, Economic Geologist, 35, single, M.Sc., D.Sc., 12 years experience in teaching, research and field operations, presently doing research in geophysics, oceanography and structural geology for contracting company. Desires teaching position with research possibilities or association with research laboratory or major company having world-wide operations. Business contacts in Europe and South America, speaks several foreign languages.

BOX 310. Mature family man with widely diversified experience desires teaching position because that is what he does best. M.Sc. degree, 1½ yrs. teaching experience, 3 yrs. experience in minerals exploration and general geology. 1 yr. in photogeology, has talent for original thinking and research. Would consider position with research organization or established consulting firm.

BOX 311. Geologist, 25, M.S., single. Presently in U. S. Army. Available Oct. 1957. Desires research or exploration position. Fluent Spanish, passable French.

BOX 313. Geologist, 33, B.S. and P.G., married, 4 years college teaching and curatorial experience, 7 years major oil company, excellent experience in surface geology, subsurface exploration, aerial photo interpretation, and development on-shore and off-shore drilling. Member GSA and AAPG. Desire work with consulting firm or small company embracing exploration and/or field geology in North America. References.

BOX 314. Geographer, Ph.D., married, 47, research and teaching experience, publications; presently teaching. Desires position with college or university at associate professor level or better. Available Sept., 1957.

BOX 315. Geologist, married, 30, B.S., nine years experience as petroleum geologist and division superintendent of independent oil company. Widespread field and sub-surface experience in Rocky Mountains and California. Now consulting. Desire position in research or teaching, or in occupation requiring more use of pure geology. Will work in any temperate or sub-tropical locality.

BOX 316. Geologist, 27, married, A.B. Geology, 1 yr. post grad., 1 yr. teaching assist., 2½ years experience in exploration work, detailed and reconnaissance mapping. Seeks permanent position in U.S. or Canada.

BOX 317. Geologist, B.S., 25, married, wants to do exploratory geology, will work anywhere. Cartography, air photo interpretation, some Spanish. Excellent references.

BOX 318. Geologist, 40, married, Ph.D. Now division geologist major oil company on Gulf Coast. Experience in subsurface and geophysical exploration. Expert log analyst. Want to relocate on or near Pacific Coast, any type of work.

BOX 319. Economic geologist, 29, M.S., Ph.D., married; 3 years consulting experience, geochemistry, widely travelled abroad and in Canada, desires relocation. Foreign work, preferably in Caribbean area, favored.

BOX 320. Geologist, 26, MA, one year U.S.G.S. Would like work in paleontology or engineering geology, preferably in the Rockies or Midwest. Opportunity for research or Ph.D. work desired, but not essential.

BOX 321. Cartographer-Photogrammetrist, 24, married, A.B. in geology, M.A. in geography. Some experience, primarily cartographic. Desires teaching position in small college or university located in the East. Would consider position with any progressive mapping organization. Available September, 1957.

BOX 322. Geologist, M.S., all Ph.D. requirements minus thesis from top university. Major fields —Petrology, Mineralogy, Structural Geology, Economic Geology including petroleum. Phi Beta Kappa, Sigma Xi. Over five years experience in responsible position, major company, including application and interpretation of geophysics and geochemistry, planning and supervision of complete surface and subsurface exploration programs. Presently employed.

BOX 323. Geophysicist—33, married, children, seeks position of responsibility. Ten years seismic experience with large contractor—all Texas districts, Okla., La., Miss., Ark., supervisory and review exp.

BOX 324. Geophysicist-Seismic Party Chief, five years field experience, B.A. Geology, broad interpretive analysis, desires position with progressive company with opportunity to locate permanently

## CONSULTANTS

**THE GEOPHOTO GROUP**
**DENVER, COLO. - CALGARY, ALTA.**
WORLD-WIDE
PHOTOGEOLOGIC EVALUATION
and
DETAILED SURFACE MAPPING

**E. J. Longyear Co.**
*Geological and Mining Consultants*
*Photogeology*

| | |
|---|---|
| Minneapolis 2, Minn. | Foshay Tower |
| New York 17, N. Y. | Graybar Bldg. |
| Denver 2, Colo. | Colorado Bldg. |
| Washington 5, D. C. | Shoreham Bldg. |
| North Bay, Ontario | Canadian Longyear Ltd. |
| Paris, France | Longyear et Cie. |

## SERVICES AND SUPPLIES

LOOKING FOR A PUBLISHER? Learn how we can publish, promote, distribute your book on a professional, dignified basis. All subjects considered. Write for Free Booklet No. 58. Vantage Press, 120 W. 31st St., New York 17, N. Y.

**Worldwide Helicopter Service**
Long or short term hire
Bell and Sikorsky Helicopters
**AUTAIR LTD.**
75 Wigmore Street, London W.1 England
Telephone: WELbeck 1131

**MINERAL SPECIMENS**
**for universities, museums and mineralogists. New 1957 Mineral Catalog free.**
***Note: We are interested in buying or exchanging for good quality minerals, especially choice quality crystals and crystal groups. Correspondence is invited.***
**FILER'S Dept. GT**
**P.O. Box 372 Redlands, California**

**THIN SECTIONS**
**Petrographic thin sections made from your cores, core chips or sedimentary or metamorphic outcrop samples. Careful attention to individual orders. Quality workmanship. Satisfaction guaranteed. Reasonable prices. Price list on request.**
**CAL-BREA, P. O. Box 254**
**BREA, CALIF.**

A.A.P.G. EMBLEMS AVAILABLE to members. Gold filled and white enamel pins, $2.08, buttons $1.97, Tie tack $2.08, Tie bar $5.65, Tie chain $5.54, and Money clip $6.48—plus local sales tax. Order direct from Dieges & Clust, 17 John Street, New York 8, N. Y. Check must accompany order.

# AGI Publications

**....professional geologists and geophysicists**
**...colleges and universities**
**..employment recruiters**
**.students**

REPORT 11, 1956-57 Edition: **Directory of Departments of Geological Science in Colleges and Universities of the U. S. and Canada.** Includes directory of summer geology field camps. Price $1.50

* * *

REPORT 12, 1956. **A Survey of Geology - Geophysics Students in 1955-56,** and of Available Scholarships, Fellowships, Assistantships, Etc. Price $0.50

* * *

**Geological Data Sheets (AGI 1-3): Map Symbols.** Price (Set of 3) $.25*

**To colleges and universities in quantities of 10 sets or more, $0.15*

* * *

**Glossary of Geology and Related Sciences,** 1957, 325 pp., 14,000 terms Price $6.00

* * *

*Order from*
**AMERICAN GEOLOGICAL INSTITUTE**
2101 Constitution Ave., N.W.
Washington 25, D. C.
payment should accompany order

GeoTimes
2101 Constitution Ave.,
Washington 25, D. C.
Form 3547 Requested
Return Postage
Guaranteed.

Non Profit Organization
U.S. POSTAGE
PAID
WASHINGTON, D. C.
PERMIT NO. 7750